Brandon Leung

b7Leung@ucsd.edu | (949) 394-8599
b7leung.github.io | Citizenship: United States

Education

University of California, San Diego (UCSD) **Sep. 2015 – Dec. 2021 (Expected)**

- **Current M.S. student in Machine Learning & Data Science**, expected graduation December 2021. GPA 3.86/4.
- **B.Sc. in Computer Science**, graduated August 2019. GPA 3.88/4 (Magna Cum Laude, with highest distinction).

Relevant coursework: *Statistical Machine Learning, Computer Vision, Probability & Statistics, Linear Algebra, Recommender Systems, Robotics Planning/Learning/Sensing, Algorithm Analysis/Design, Operating Systems, Computer Networking, Computer Security, Theory of Computation, Computer Architecture.*

Research Interests & Experience

- **2D Computer Vision** (recognition, detection, semantic segmentation).
- **3D Computer Vision** (recognition, detection, single view reconstruction, 3D completion).
- **Deep Learning** (unsupervised learning, adversarial attacks, continual learning, long-tailed learning, robustness, network distillation).
- **Transfer Learning** (low-shot learning, meta learning, transfer learning, domain adaptation).
- **NLP** (sentiment analysis, clustering, style transfer, generative modeling).
- **Statistics/Data Science** (Bayesian & Frequentist statistical modeling, regression models, hypothesis testing).

Significant Projects

Drone Flight Dataset for Neural Network Classification Robustness [details] **Sep. 2018 – Present**

- Project leader & main developer of a novel drone flight system, recruiting 13 to collect a 120,000 image dataset.
- Published to CVPR; conducted experiments showing severe vulnerabilities (30% drop) in neural networks like ResNet to pose & camera shake. Extensively used Python, PyTorch, OpenCV, and ROS in an Ubuntu environment.

Refining Single View 3D Reconstructions with Self-Supervised Machine Learning [details] **Jan. 2021 – Present**

- Developed a novel neural network refinement algorithm to generate 3D meshes from a single image.
- Used self-supervised learning & symmetry regularization; beats state-of-the-art (up to 47%), across many datasets.

Self-Driving Cars using 2D/3D Action and Explanation Prediction [details] **Feb. 2021 – Present**

- Guided formulation & development of a model fusing 2D images & 3D pointclouds for self-driving car navigation.
- 2D & 3D explanations from Faster R-CNN & MVX-Net are jointly predicted with actions, justifying model decisions.
- Annotated new action & explanation annotations labels from Amazon Turk to add to the Waymo Open dataset.

Statistical Linguistic Analysis for User Chat Message Logs [details] **Feb. 2021 – Jul. 2021**

- Built an interactive dashboard to analyze user chat logs and describe their linguistic behavior.
- Applied NLP transformer models (RoBERTa, GPT-2) to sentiment analysis, clustering, style transfer, & generation.
- Developed with Voilà. Tested with pytest and documented with Sphinx. Deployed using AWS (EC2 and S3).

Domain Adaptation for Real-World Single View 3D Reconstruction [details] **Jun. 2020 – Dec. 2020**

- Studied the application of several domain adaptation methods (MMD, Deep CORAL, DANN) to 3D reconstruction.
- Proposed a new architecture, involving multitask learning with domain adversarial learning.

Review and Unification of Unsupervised Domain Adaptation [details] **Jul. 2020 – Nov. 2020**

- Formulated a unified taxonomy to generalize methods in the unsupervised domain adaptation literature.
- Critically analyzed Contrastive Adaptation Networks, indicating areas of modification to improve it.

Connect Four AI Using Reinforcement Learning [details] **Mar. 2020 – Jun. 2020**

- Developed an AI to play Connect Four, using Q-Learning and Monte-Carlo policy iteration.
- Formally described the game as a Markov decision process; generated episodes using self-play.

Selected Publications

- **Leung, B.***, Ho, C. H.*, Sandstrom, E., Chang, Y., & Vasconcelos, N. (2019). *Catastrophic child's play: Easy to perform, hard to defend adversarial attacks.* In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR).
- **Leung, B.** (2021). *Black-box test-time shape refinement for single view 3d reconstruction*. MS Thesis.
- **Leung, B.**, Ho, C. H., Persekian, A., Orozco, D., Chang, Y., Sandstrom, E., Liu, B., & Vasconcelos, N. (2019). *Oowl500: Overcoming dataset collection bias in the wild.* ArXiv:2108.10992
- **Leung, B.**, Singh, S., & Horodniceanu, A. (2021). *Domain adaptation for real-world single view 3d reconstruction.* ArXiv:2108.10972

Professional Experience

Graduate Student Researcher — **Statistical Visual Computing Lab, UCSD** — **Jun. 2017 – Present**

- Researching machine learning & computer vision under Prof. Nuno Vasconcelos, with a focus in 2D/3D detection, domain adaptation, GANs, 3D reconstruction, self-supervised learning, and explainable neural networks.

Software Engineer, Intern — **Himax Imaging** — **Summers 2015 & 2016**

- Developed internal quality control programs in Java for a R&D/fabrication company specializing in CMOS image sensors used in smartphone cameras and car backup cameras.

Awards

- **NSF Graduate Research Fellowship**, Mar. 2020.
- **Sloan Foundation Graduate Fellowship**, Sep. 2019.
- **STARS Graduate Fellowship**, Sep. 2019.
- **UCSD ECE Departmental Graduate Fellowship**, Sep. 2019.
- **UCSD Undergraduate Research Award**, awarded to 2 graduating UCSD ECE students each year, May 2019.
- **Qualcomm Alumni Scholarship**, Sep. 2018.
- **NSF REU Research Grant**, Sep. 2018.
- **Phi Beta Kappa Academic Honor Society Inductee**, Jun. 2018.
- **Ledell Research Scholarship** for Science and Engineering, Jun. 2018.
- **Caledonian Honor Society Inductee**, Muir College at UCSD, May 2018.
- **University of California LEADS Scholarship**, Apr. 2017.

Teaching Experience

TA, Data Science Theoretical Foundations II — **UCSD** — **Fall Quarter 2018**

- DSC 40A, with Professor Janine Tiefenbruck.

TA, Data Science Theoretical Foundations II — **UCSD** — **Spring Quarter 2018**

- DSC 40B, with Professor Janine Tiefenbruck.

TA, Introduction to Programming Java — **UCSD** — **Winter Quarter 2018**

- CSE 8A, with Professor Christine Alvarado.

Additional Experience

IT Technician — **UCSD** — **Aug. 2016 – Feb. 2017**

- Provided tier 1 networking, software, and hardware IT support for the over 35,000 students and staff at UCSD.

RMA Technician — **Alpha Networks** — **Summer 2014**

- Troubleshot and repaired routers, modems, switches, and other networking components at Alpha Network's RMA division.

Outreach & Mentorship

SRIP Research Mentor — **UCSD** — **Summers 2018 – 2021**

- Mentored students in the Spring/Summer Research Intern Program (SRIP) in computer vision research.

GEAR Research Mentor — **UCSD** — **2019 – 2020**

- Mentored students in Guided Engineering Apprenticeship in Research (GEAR) program in computer vision research.

ENLACE Research Mentor — **UCSD** — **Summers 2018 & 2019**

- Mentored students in ENLACE, a high school outreach program promoting diversity in research, especially in Hispanic communities.

Academic Services

- **Conference Reviewer**: ICCV 2021, CVPR 2021, ECCV 2020 Workshop on Imbalance Problems in Computer Vision (IPCV).
- **Volunteer & Staff Member**: CVPR 2020 Area Chair Meeting, San Diego

Technical Skills

- **Expertise in:** Python, PyTorch, PyTorch3D, OpenCV, Numpy, Pandas, Plotly, Jupyter Notebooks, pytest, Sphinx, Bash, Docker, Kubernetes, Vim.
- **Experience with:** Java, C, HTML/CSS, JavaScript, AWS, Matlab, Amazon Turk.

Languages

English, Cantonese.